PATENT SPECIFICATION

589,260

No. 7081/45.

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Complete Specification Left: March 12, 1946.

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PROVISIONAL SPECIFICATION

An Improved Method of Bonding together Wood and Metal

We, PRESSED STEEL COMPANY LIMITED, a British Company, of Cowley, Oxford, Oxfordshire, and WILLIAM CURTIS MATON, a British Subject, of "Kernanderry", Frilford Heath, Abingdon, Berkshire, do hereby declare the nature of this invention to be as follows:—

The present invention relates to an improved method of bonding together wood and metal, particularly thin wood such as a veneer, and metal panels and its object is to provide a permanent and secure bond of the one to the other, the metal providing the strength or load bearing part of the structure and the wood a pleasing and attractive finish. One application of the invention is to instrument panels and facia boards for automobiles.

According to the invention a wood veneer is bonded to a metal panel by means of an adhesive, the metal panel being formed with perforations into which the adhesive will enter to provide a number of keys supplementing the normal adhesion between the surfaces.

To increase the keying action the edges of the perforations may be countersunk or formed with jagged edges.

Thermo-plastic or thermo-setting resins may be used as the adhesive, both of which may require heat treatment, or curing, to be effective. The curing may be carried out in a heated platen press, an autoclave or by indirect heating such for example as by passing an electric current through the metal panel, using conveniently for the purpose an electric resistance welding machine. Where an autoclave is used it will be necessary to hold the panels in formers or jigs throughout the curing process.

In place of the adhesives so far referred to, may be used, an adhesive of the kind which sets or dries by evaporation of a solvent such for example as rubber type solutions. Again, emulsion type adhesives may be used, where setting is accomplished by evaporation of one or more of the phases of the emulsion, such for example as bituminous emulsions or a ropy starch adhesive may be used.

When using the solution or emulsion type adhesives, the provision of the perforations in the initial panel promotes a more rapid setting of the adhesive.

In some cases it may be desirable to place a sheet of paper, thin fibre board or fabric between the veneer and the metal sheet to reinforce the veneer and to toughen the joint.

If it is desired to increase the strength of the bond still further, a sheet of paper or fabric or a synthetic resin treated fabric may be placed on the metal on the opposite side of the metal to the veneer, and this will have the effect of causing a homogeneous bond from the back of the metal through the perforation to the veneer on the finished surface.

Another method is to place the wood veneer on a thin film of a suitable plastic which can then be placed on the perforated metal the whole being cured under pressure causing the plastic to flow or exude through the perforations and at the same time penetrate the pores of the wood veneer thereby ensuring a secure bond.

Dated the 21st day of March, 1945.

T. M. CONNELLY,
Chartered Patent Agent,
Agent for the Applicants.

COMPLETE SPECIFICATION

An Improved Method of Bonding together Wood and Metal

We, PRESSED STEEL COMPANY LIMITED, a British Company, of Cowley, Oxford, Oxfordshire, and WILLIAM CURTIS MATON, a British Subject, of "Kernanderry", Frilford Heath, Abingdon, Berkshire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by th following statement:—

The present invention relates to an improved method of bonding together

wood and metal, particularly thin wood such as a veneer, and metal panels and its object is to provide a permanent and secure bond of the one to the other, the metal providing the strength or load bearing part of the structure and the wood a pleasing and attractive finish. One application of the invention is to instrument panels and facia boards for automobiles.

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Another method is to place the wood veneer on a thin film of a suitable plastic which can then be placed on the perforated metal the whole being cured under pressure causing the plastic to flow or exude thr ugh the perforations and at the same time penetrate the p res of the wood veneer thereby ensuring a secur bond.

The invention is illustrated in the accompanying drawings of which Figure 1 is a perspective view of a perforated sheet metal panel as a constituent of an instrument board for a motor vehicle.

Figure 2 is a perspective view of the sheet metal panel of Figure 1 in juxtaposition to a wood facing panel.

Figure 3 is a somewhat diagrammatic representation of a press for pressing together the metal and wood panels with or without the application of heat, and

Figures 4, 5 and 6 are part sections to an enlarged scale through the completed instrument board.

The metal panel 11 is formed with openings such as 12 and 13 for the reception of the usual instruments and has an upper beaded edge 14 and a lower inturned edge 15. The whole area of the panel 11 is formed with perforations 16. The facing panel 21 preferably of an appropriate wood veneer is shaped similarly and is formed with openings 22 and 23, an upper beaded edge 24 and an inturned lower edge 25.

To assemble the panels the surface of the wood panel 21 facing towards the sheet metal panel 11 is coated with an adhesive, the panels 11 and 21 are placed together and held together under pressure by, for example, the blocks 30 and 31 until the adhesive is set and the two panels firmly joined together.

If desired, heat may be applied simultaneously with pressure, the blocks 30 and 31 being heated for example by passing steam through pipes embedded therein or magnetically. As an alternative the metal panel of the composite instrument board may be heated electrically by connecting it in the circuit of a resistance welding machine and causing a current to pass through the metal panel to raise it to a curing temperature in a uniform manner throughout its area. Again, the composite panel may be placed in an autoclave to effect curing being held in position by a suitable jig or former.

Application of heat to the panels when pressed together may not be necessary, the question depending on the type of adhesive employed. The method of applying heat, however, forms no part of the present invention.

The provision of the perforations 16 in the metal panel 11 is an important feature of this invention and will b understood from a reference to Figures 4—6 of the drawings. In Figure 4 for example the panel 11 is formed with straight through

or clean perforations 16^1 into which perforations the adhesive, shown at 29, passes to form a series of cylindrical keys assisting the normal adhesion between the surfaces. To increase the keying effect a backing strip 28 of mesh, fabric, paper or plastic impregnated fabric may be used as shown in Figure 4 between which and the metal panel 11 is formed a layer of adhesive 29^1 integral with the cylinders of adhesive in the perforations 16^1 and, of course, with the layer of adhesive between the panels 11 and 21, thus providing a very secure bond.

In order to increase the keying effect of the adhesive the perforations in the panel may be countersunk as shown in Figure 5. Here the perforations 16^2 are countersunk outwardly from the contiguous faces of the panels 11 and 21 and the adhesive 29 penetrates these perforations and when set presents a series of firm key members. If desired, the adhesive may be allowed to project beyond the rear face of the panel 11 to provide a series of knobs 32 ensuring a still greater keying or interlocking effect.

In the alternative arrangement of Figure 6 the metal panel 11 is formed with straight through perforations 16^3 having jagged edges as indicated at 16^4, the adhesive 29 in this case overrunning the jagged edges 16^4 and presenting a series of knobs 33 similar to the knobs 32.

It will be clear that if the grain of the wood veneer panel 21 is coarse the adhesive will additionally penetrate the grain, still further to increase the keying or bonding effect.

Although the invention has been described in its application to a composite metal-wood veneer panel to be used for an instrument or facia panel for a vehicle body it must be understood that the invention has a very wide range of applicability.

There have been many proposals for joining together sheets of similar or dissimilar materials, for example, sheets of metal, such as aluminium foil, are bonded with materials such as leather, wood, asbestos, fabrics of silk or wool and fabrics or sheets of cellulosic substances by using as the glue or cement thermoplastic synthetic resins which are applied to the metal foil, the other material being then placed on the foil and the union effected by ironing or hot calendering. As an example of the glue or cement may be given polymers of alkyl or alkoxyalkyl esters of α-alkylacrylic acids. In another arrangement, sheets are joined by applying between the surfaces to be united layers of powders, which are intimate mixtures of finely divided organic derivatives of cellulose and one or more plasticisers produced by simply mixing or grinding together without a solvent, the sheets being subjected to heat and pressure to cause the powders to coalesce and bind the sheets together. In yet a further arrangement, thin layers of wood are strengthened by interposed layers of metal, which may be perforated sheets or woven metal fabric, the layers being simply glued together under pressure in the dry state.

It is known when uniting materials having smooth surfaces to make holes through the sheets to be joined, the axes of these holes being preferably not at right angles to the surface in order to produce a better locking effect. Such holes have in some instances been screw-threaded, whilst in other instances instead of holes, recesses or grooves of increasing cross-section so as to form undercut portions have been formed in the sheets.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of bonding together a single wood veneer panel and a sheet metal panel which consists of forming perforations in the sheet metal panel, applying an adhesive to the veneer panel and pressing the veneer panel into contact with the sheet metal panel so that the adhesive penetrates the perforations and constitutes a plurality of holding keys supplementing the normal adhesion between the surfaces.

2. A method as claimed in Claim 1 in which the perforations in the metal panel are countersunk or formed with jagged or irregular edges.

3. A method as claimed in Claim 1 in which a thermo-plastic or thermo-setting resin is employed as the adhesive and the joint is subjected to a curing treatment.

4. A method as claimed in Claim 1 in which an adhesive of the kind setting by evaporation of a solvent or an emulsion type is employed.

5. A method as claimed in any of the preceding claims in which a sheet of paper, fabric or thin fibre board is placed between the panel and the veneer.

6. A method as claimed in any of the preceding claims in which a sheet of paper, fabric or the like is placed in contact with the metal panel on the surface opposite to that carrying the veneer before pressing the veneer on to the panel.

7. A method of bonding together a wood veneer and a sheet metal panel substantially as hereinbefore described and illustrated in th accompanying drawings.

Dated the 12th day of March, 1946.

T. M. CONNELLY,
Chartered Patent Agent,
Agent for the Applicants.

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[This Drawing is a reproduction of the Original on a reduced scale.]

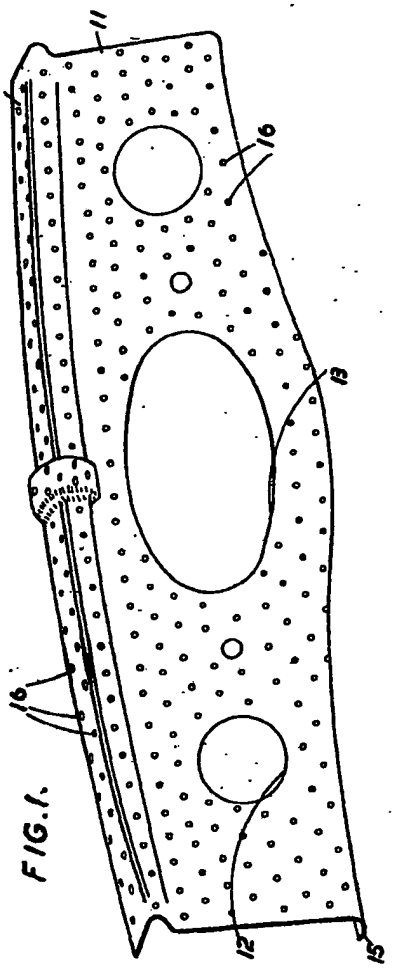

FIG. 1.

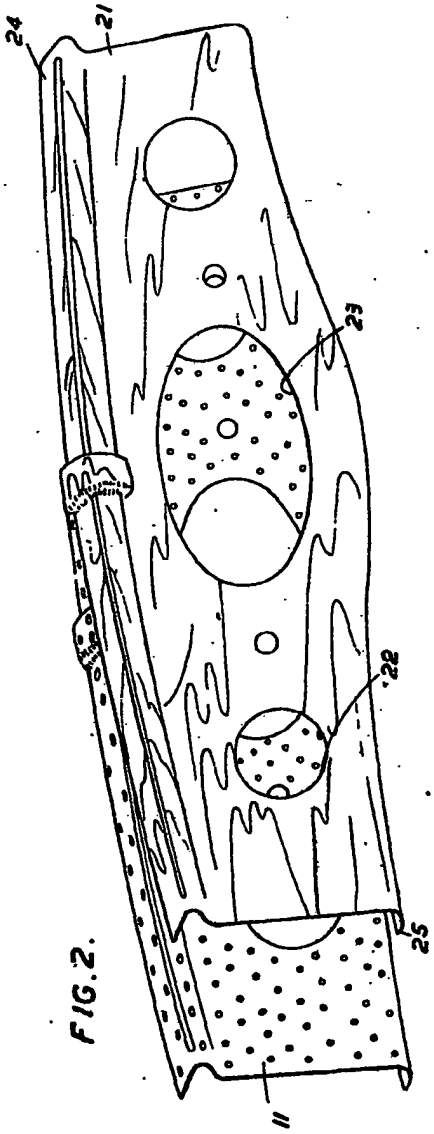

FIG. 2.

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FIG.3.

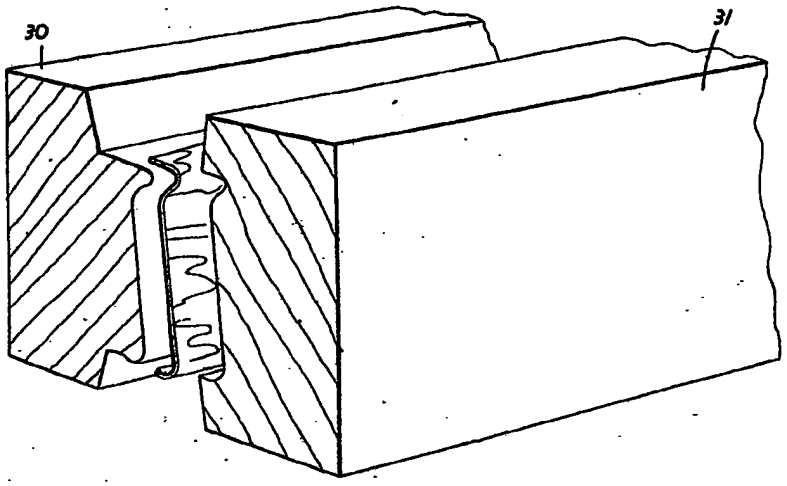

FIG.4

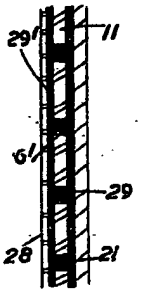

FIG.5

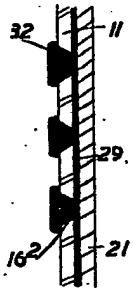

FIG.6.